

Such maps could be of the sort recently published by Frank Gates in his "Flora of Kansas" and by Charles Deam in his "Flora of Indiana." They should be compiled on the basis of all the preserved material in all the important private and institutional herbaria in this area, and not merely on the basis of the material in one or a very few herbaria. Such a series of maps would show graphically where members of the Club could profitably botanize. The reward of being able to extend the known distribution of a species or variety in one direction or another in our area ought to provide a sufficient incentive to much worthwhile botanizing and collecting in a region which is fast being changed by the rapid advance of civilization.

NEW YORK BOTANICAL GARDEN.

BOOK REVIEWS

One More Textbook

Textbook of Botany. E. N. Transeau, H. C. Sampson and L. H. Tiffany, Harper & Brothers. 1940. \$4.00.

The first botany presented to beginners and the general public was taxonomic; later it became morphology, especially the comparative morphology of a series of types interpreted by a theory of descent. Recently an attempt has been made to teach a more "biological" botany, to emphasize the functions of plants as a means of formulating a concept of life. Still more recently ecology has won recognition as a teachable point of view and botany has become the study of vegetation and its relations with animal life and human civilization.

The *Textbook of Botany* by Transeau, Sampson, and Tiffany (though it opens in the good old-fashioned way with a description of a bean seedling) represents, more competently than any other recent text, the most modern approach to "general" botany. This latest arrival in the family of botanical texts is a big book of 812 pages, with 424 illustrations, several in color. There are fifty-three chapters, beginning with "Plant Science," "The Parts of Plants," "Learning to Name Plants," "Seasonal Aspects of Plants," and continuing with "The Tissue Systems of Leaves," "A Bit of Useful

Chemistry," the manufacture and use of food, the relations of plants with water, the tissues and processes of stems and roots, reproduction and heredity in flowering plants, to descriptions of algae, fungi, and other plant groups, and the final chapters on "Plants of the Past" and "The Vegetation of North America." The book is beautifully printed, the illustrations well chosen and well reproduced, and the text interestingly and clearly written. Even the English is good—for botanists.

The arrangement of topics is evidently designed to fit a particular course. The early chapters are written with a view to outdoor work by beginning students, and consequently seem to the general reader somewhat desultory and disjointed. But with Chapter VII we begin to reach the meat of the subject. And it is rich fare, lacking neither in variety nor in nutritive qualities. A student who digests the bulk of this volume will know more botany than some young instructors. Such topics as the condensation and digestion of carbohydrates and the synthesis of fats and proteins are treated in far greater detail than in other general textbooks. Some idea of the bias of the book may be obtained from the titles of the chapters devoted to flowers: Chapter XXXI, "Initiation of Flowers" (18 p.); Chapter XXXII, "Flowers, Fruits, and Seeds" (20 p.); Chapter XXXIII, "Sexual Reproduction in Flowers" (16 p.); and Chapter XXIV, "Growth, Dormancy, and Germination of Seeds" (13 p.). Physiology here wins parity with the morphological detail long considered essential in a scholarly text. The only criticism of such a treatment is that it has been perhaps carried too far. The wealth of chemical detail particularly seems to this reviewer rather strong meat for the average college freshman.

One of the best features of the book is the frequent introduction of actual data, which initiates the reader thoroughly into scientific method and should impress him with the nature of scientific conclusions as contrasted with purely authoritarian statement. Useful references for further reading are found at the ends of many chapters, mostly to texts and reviews, but many to original researches. Many subjects are treated with a wealth of tabular and numerical detail which should impress and interest students. On page 122, for instance, we learn that an elm tree may have 250,000,000 chloroplasts to every square inch of leaf surface, and sixteen acres of total chloroplast surface. On page 313 is a

table showing the total surface of the 2,000,000 feet of roots and 6,000 miles of root hairs of a single grass. There are many such tables.

The development of physiology has been at the expense of taxonomy, morphology, and even genetics. Chapter III, "Learning How to Name Plants," really is concerned with the terminology of leaves, and contains scant reference to the naming of plants. There is nowhere in the book any attempt to present a scheme of classification of the plant world or to explain the principles on which such a scheme might be based. The comparative morphology of the various groups, *i.e.*, what used to be called a survey of the plant kingdom, occupies only about a fifth of the book, and the descriptions of the so-called lower groups are scamped to a degree which will disappoint many teachers and even some students. A book of this size might be expected at least to serve as a reference work for a certain amount of morphological detail. In short, while the reviewer has long advocated a trend in this direction, he feels that this book has over-shot the mark. The treatment of genetics seems at the same time over-simplified and involved. Meiosis is represented as involving merely the pairing and disjunction of homologous chromosomes ("the chromosomes do not 'split'"). Crossing-over is mentioned only incidentally in the following confused statement: "A third type of irregularity has been variously called 'translocation,' 'segmental interchange,' and 'crossing-over.'"

The wider the scope of a general text, the more certainly will there be errors. In this book a few are evident. Perhaps the worst is the statement on page 402 that "embryos develop from vegetative cells in the notches of the leaves of bryophyllum." On page 55 a distinction should be made between light (which does not increase the rate of evaporation) and the heat due to absorption of light (which does). On page 202 we are led to believe that the solution of sugar in water will always cause an increase in volume of the liquid. On page 527 Franz Schulze is referred to as "Schultze." On page 582 *Plasmodiophora Brassicae* is described as "a simple mold." Inflorescences, so commonly confused by modern botanists, are more than usually so on pages 360 and 361, where an attempt is made to classify them without reference to the order of flowering, and the milkweed acquires an umbel in consequence. Figure 45 is wrongly oriented.

A few peculiarities of terminology seem unnecessary. The reasoning that substitutes "ovulary" for ovary should also lead to the introduction of new terms for egg, sperm, micropyle, epidermis, respiration, and many others. And there seems no reason at all why the familiar and inoffensive "haploid" should be replaced by such an etymological waif as "monoploid."

It is always a pleasure to read a textbook which does not stultify itself with the Spencerian teleology which has so long dominated the teaching of biology. However, the philosophy which expels teleology must be more rigorous than that which let it creep in. It is not sufficient to refer to the lack of consciousness in plants; automobiles and watches have purposes, and perhaps even in more than one sense. If the scientific approach merits discussion, the intelligent student has a right to a better treatment than that of Chapter VI. The biologist, instead of attempting to show the absurdity of teleology (which is not absurd), should devote his efforts to demonstrating its uselessness in science and the usefulness of the mechanistic view.

Errors and defects are inevitable in any large work and need not interfere seriously with its use; the experienced teacher will be able to detect them and to make allowance for them. It may safely be said that this is the best textbook of botany and the most significant contribution to the teaching of the subject that has appeared in several years, and should be of great value to teachers who have students and assistants capable of handling so detailed a presentation and who sympathize with its definition of what should be taught in an elementary course.

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Plants and Man

Plants and Man. Clarence J. Hylander and Oran B. Stanley. X+518 pages. Blakiston Co. 1941. \$3.00.

Quite different from the usual textbook is this one prepared for a one semester course in Junior Colleges and Teacher Training Colleges. It is planned primarily as a cultural course for those who may take no further work in botany, appealing to the interest of students by stressing man's dependence on plants. Chiefly a text on economic botany, it discusses in addition the structures and